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Effect of Infusions of Plant Crops on the Quality Seed Yellow Sweet Clover.

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ABSTRACT

The results of laboratory studies on allelopathic influence of different concentrations of extracts of post-harvest residues of winter barley, corn, sorghum and sunflower on sowing qualities of seeds and growth and development of seedlings of sweet clover yellow. It established a strong and very strong inhibitory effect of plant residues of maize and sorghum on the germination of sweet clover seed. Infusions of vegetable residues of sunflower and winter barley have mild to moderate inhibitory allelopathic effects on seed germination and initial seedling growth of clover yellow. When designing schemes field rotations necessary to consider that for optimal activity allelopathic precursors for yellow sweet clover are sunflower and winter barley. Corn and sorghum have a negative impact on crop quality and seedling yellow sweet clover growth.

Keywords: yellow sweet clover, germination, seedlings, allelopathy, infusions of post-harvest residues.

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INTRODUCTION

Growth and development of yellow sweet clover depends not only on the biological characteristics of the fodder crop, but also on the various environmental factors that affect seed germination and initial seedling growth [1]. The creation of better conditions for the formation of high yields of sweet clover is needed to optimize agricultural technology, by selection the previous crop on the basis of study of their allelopathic activity.

Stavropol region are characterized by the presence of the arid zones and large areas of saline soils, these circumstances indicate the need for a differentiated approach in the selection of highly productive legumes for use in feed production and selection of the best precursors for the most important crops. Of particular interest is the culture of yellow sweet clover (*Melilotus officinalis*), which is subject to the proper cultivation technology generates relatively high yields of forage and seeds [2, 3].

The crop of clover is characterized by a high content of protein. It has been established that 1 kg of air-dried of sweet clover substance contains 0,66-0,71 feeding units and 164,8-180,0 grams digestible protein. Security 1 feed unit of digestible protein is 238.0 - 257.1 g [4, 5].

Sweet clover improves soil structure and enriches it with nitrogen environmentally friendly, it enhances the yield of subsequent crops. So, in the arid zone of the Stavropol Territory on the predecessor yellow sweet clover and fallow land yield of winter wheat varieties Fortuna in 2011, about the same, and 33% higher than the yield of winter wheat predecessor. Sweet clover was the best predecessor for winter barley varieties Dostoyny productivity is 40.4% higher than that the predecessor [6, 7].

Sweet clover, as a precursor has a significant impact on the amount of nitrate nitrogen in the soil, on the content of the main macronutrients in winter barley plants. According to the diagnostic sheet, nitrogen and phosphorus content was respectively 2.95% and 1.13%. If the predecessor was fallow land without fertilizer: nitrogen - 2.80%, phosphorus - 1.0% [8].

Donnik is characterized salt tolerance, seeds of clover in a salinisation at a concentration of sodium chloride to 0.98% have high sowing qualities parameters of seedling length and accumulation of biomass in the initial stages of growth and development. This indicates that they are highly resistant to salinity [9, 10].

From the set of abiotic factors affecting the germination of sweet clover should be allocated the allelopathy - one of the complex ecological relationships of plants that produce a variety of chemicals and negatively or positively affect their growth and development.

The purpose of our research is to study the allelopathic activity of the post-harvest crop residues on the crop and the quality growth of the seedlings of sweet clover.

MATERIALS AND METHODS

The object of the research is zoned in Stavropol Krai new variety of yellow sweet clover - Donchev. Allelopathic activity of post-harvest residues of crops on sowing qualities of seeds and initial growth of seedlings of sweet clover yellow was determined by growing the seeds of sweet clover in different concentrations infusion. For infusion of selected post-harvest aboveground plant organs crops: winter barley, sorghum, corn and sunflower. Grinded plant residues, weighing 100 g pour 1 liter of distilled water and infused for days at a temperature of 20-22 °C. The obtained extracts was mixed with distilled water to obtain the studied concentrations. Low concentrations of infusion of crop residues: 0; 5; 10; 15; and 20%, high concentration infusion: 0; 25; 50; 75; and 100%. Sweet clover seeds were grown in a petri dish on filter paper in the dark. On the filter paper pieces were placed on 100 seeds were wetted with 10 ml of infusion certain concentration. Repeated experiments fourfold. The energy of germination and germination of seeds of yellow of sweet clover was determined in accordance with all-Union State Standard 12038-84.

RESULTS AND DISCUSSION

Studies have shown that the studied concentration infusions of crops have a varying degrees of allelopathic effects. For example, low concentrations infusion of sunflower (5-20%) have no significant effect on the vigor of sweet clover seed. In this variant of the experiment at a concentration of 20% active component decreased compared to the reference on 3% by $NSR_{05} = 4.5$. Deviation seeds of growth of energy reported in the variants with infusion of winter barley, which is weak inhibition on this indicator - by 4% at $NSR_{05} = 2.1$. Significant growth inhibition of of sweet clover seeds found in versions with crops of sorghum and maize. At a concentration of 10% reduction of the infusion of seed vigor of sweet clover was 10 and 14%. This 2.9 and 4.1 times the difference is not significant.

The study of exposure to high concentrations of 25 to 100% brew sorghum and maize showed their strong negative allelopathic effect on the energy growth of sweet clover seed. Thus, when the concentration of the infusion - 75%, the rate of sowing qualities of of sweet clover seed, from the effects of maize decreased by 2.9, sorghum - 2.2, winter barley - 1.9 times.

High concentrations the infusion of sunflower (25 to 75%) had a positive allelopathic effect, increasing the vigor of sweet clover seed to 8-2% in comparison with the control. When the concentration of sunflower infusion of up to 100% a decrease of this index by 7%.

Results allelopathic effects of concentrations infusions of post-harvest residues of crops on germination of sweet clover seeds are shown in Table. Low concentrations of the studied infusion (5-20%) reduced the germination of sweet clover by 18-23%.

Table: Allelopathic influence infusion crop residues on the germination of seeds of yellow sweet clover,%

The concentration of infusion, %	Winter barley	Sorghum	Maize	Sunflower
	Low concentrations of infusion			
0	78	72	75	78
5	58	66	63	78
10	57	59	63	71
15	57	54	62	62
20	55	52	55	60
HCP ₀₅	2,9	2,6	4,1	2,7
High concentrations of infusion				
0	69	76	75	76
25	48	38	21	50
50	41	25	2	42
75	37	13	2	37
100	30	9	1	37
HCP ₀₅	1,6	4,8	2,5	2,9

Minimum reduction seed germination of sweet clover at low concentrations is highly noted in the variant with sunflower - 18%.

In an experiment to study the high concentrations found that infusions of 25 to 75% of the sorghum and maize in particular have a very strong negative allelopathic effects on germination and initial growth of sweet clover sprouts. Infusions of these crops reduce the germination of seeds of sweet clover from 38 to 73%. The maximum decrease in germination sweet clover produced in the version with infusions of corn, even at a concentration of 50% germination rate of infusion sweet clover decreased by 73%.

Increasing concentrations of infusions of 25 to 75% showed a decrease in seed germination of sweet clover in variant with winter barley with 7-11% in the embodiment with sunflower - 8-13%. In comparison with control variant, respectively, in 21-32% and 26-39%. This is 1.5 -2.0 times lower than in the embodiments of corn and sorghum. High concentrations of infusion of barley and sunflower provided average and strong

allelopathic effects on germination of of sweet clover, with the gradation level of allelopathic effects - 26-50% - strong.

Low concentrations of infusions vegetable post-harvest crop residues of the same effect on linear growth of seedlings. Reducing the length of the 10-day-old seedlings of sweet clover in all variants of infusion at concentrations of 15 and 20% experience inhibit the growth of seedlings of sweet clover, reducing their length of 10-13 mm.

In embodiments with high concentrations of infusions there are sharp differences in allelopathic inhibitory effects of the studied crops on the growth and development of seedlings of sweet clover. Strong growth inhibition sprouts of sweet clover cause at concentration 25-75% of the infusions sorghum and maize, of sweet clover sprouts reduce the length, respectively, and 12,0-62,0 69,0-77,0 mm, it 1,2-4 9 and 6,3-16.4 half length control seedlings.

High concentrations of extracts of winter barley and sunflower weakly inhibited the growth of seedlings, at concentrations of 25-75%, the length of seedlings as compared to the control for this decreased, respectively, and 6,0-16,0 19,0-22,0 mm.

CONCLUSION

Allelopathic activity of extracts of winter barley-harvest crop residues, sorghum, maize and sunflower manifested in varying degrees, adversely affecting the quality of the crop, growth and development of yellow of sweet clover. High concentrations of infusion sorghum and maize (25 to 75%) have a strong and very strong negative allelopathic effect of reducing the germination energy of sweet clover seed in 2.2-2.9 times, and the germination rate of 38 to 73%.

Extracts of winter barley cause small and medium inhibition, reducing the germination of seeds of sweet clover on 21-32%, sunflower extracts to 26-39%.

Allelopathy as environmental factor, inhibits the growth and development of seedlings of sweet clover. High concentrations of extracts winter barley and sunflower weakly inhibit the growth of seedlings, their length is reduced by 6,0-16,0 and 19,0-22,0 mm. Strong inhibition of the growth of sweet clover sprouts stimulate infusions sorghum and corn, reducing the length of sprouts on 12,0-62,0 and 69,0-77,0 mm.

In the development of field crop rotation schemes must be borne in mind that the optimum precursors for sweet clover is sunflower and winter barley. Corn and sorghum have a negative impact on crop quality and growth seedling yellow sweet clover.

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